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COMPLETE SPECIFICATION

Digestion and Defibration of Ligno-Cellulosic Material

I, JOHN BOLJA, a subject of the King of Sweden, residing at Ingenjörfirman Fibroteknik, Stureplan 19^{IV}, Stockholm, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the digestion and defibration of ligno-cellulosic material, for instance wood, and is concerned with an improved method and a suitable apparatus therefor.

When making fibre boards logs from pine, fir, aspen or other trees are cut into logs or chips which are then defibrated according to known methods among which the following may be mentioned: grinding, blasting chips by means of steam pressure, defibration at steam pressure, defibration of brown stoved or brown steamed chips and defibration of chips which have been boiled in water at normal pressure.

By these known methods, however, it is difficult to obtain a sufficient and continuous heat treatment of the chips before defibration to obtain a mass and has a more or less brownish colour. Such a mass is desirable and necessary if fibre boards, especially pressed fibre of high quality, are to be made. In practice it is found that boards which are prepared from chips that are sufficiently heat treated will in comparison with other boards be more easily sized or impregnated and will be more "dead", i.e. less sensitive to all variations as regards the humidity and temperature of the air.

Such a heat treatment of the chips is obtainable by the method according to the invention, which comprises performing the heat treatment continuously at temperatures above 100° C. in a closed boiler into the upper end of which chips are fed by means of a higher pressure than that corresponding to the temperature in the boiler, subjecting the

chips to a heat treatment in the boiler, transporting them from the bottom of the boiler by means of an elevating transporting device the upper end of which is closely connected to an outlet device so constructed that it will check escape of steam by compressing the chips therein so as to form a plug which will result in a higher frictional resistance being set up in the outlet device than the out-blasting force corresponding to the pressure in the boiler and feeding the chips from the outlet device either into one or several additional similar boilers in series and eventually into a grinder or defibrator in which it is defibrated immediately at atmospheric pressure or directly from said outlet device to said grinder or defibrator.

Due to the gland effect of the outlet device warm boiler liquor a certain proportion of which will accompany the chips in the transporting device can be prevented from accompanying the chips when these are leaving the outlet device and can be caused instead to flow back to or remain in the boiler with the result that its heat content will be used and the heat economy of the process will be essentially improved.

The apparatus for carrying out the method comprises a boiler, or several boilers arranged in series, a grinder and a transporting device arranged between the, or the last, boiler and the grinder, and between each boiler and the next when two or more boilers are arranged in series, said apparatus being characterized by an inlet device which is tightly connected to the upper end of the, or the first, boiler and which is constructed so as to feed the chips into the boiler at a higher pressure than that corresponding to the temperature of the boiler and by constructing the transporting device so as to cause any boiler liquor accompanying the chips to flow back into the boiler, and by an outlet device which is tightly

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connected to the upper end of the transporting device and the next boiler or the grinder respectively and which is constructed so as to check escape of steam by compressing the chips therein to a plug.

The invention will now be described in more detail with reference to the accompanying drawings which show one form of apparatus for carrying out the method according to the invention. In the drawings:—

Figure 1 is a side view of the apparatus with some parts shown in vertical section, and

Figure 2 is a plan view of the apparatus.

The apparatus illustrated is an improvement of that disclosed in Swedish Patent Specification No. 106,602 and like the latter it comprises a hopper 1 for the chips, a boiler 2, an elevating transporting screw 3 connected to the bottom of the boiler and a grinding machine or defibrator 4. Between the hopper and the upper end of the boiler 2 there is an inlet device 5 having a feeding screw which will force chips falling down from the hopper 1 to move to the upper end of the boiler where the device has a reduced channel 6 in which the chips will form a plug that will be pressed into the boiler 2 at a pressure higher than the pressure in the boiler. The inlet device 5 is so constructed with respect to variations in its working that the quantity fed in can be regulated in relation to the quantity of heat treated chips fed out so as to maintain the boiler filled with chips. Further, the boiler 2 is provided with a gauge glass (not shown) to allow inspection of the quantity of boiler liquor and with a valve (not shown) controlled by a thermostat for regulating the temperature during the heat treatment. A screw 7 horizontally arranged at the bottom of the boiler 2 takes the treated chips out of the boiler to the elevating transporting device 3, to the upper end of which an outlet device 8 is connected which leads to the grinder 4 and is provided with a horizontal feeding screw which will press the chips from the transporting device to the inlet opening of the grinding machine 4. The outlet device 8 is tightly connected both to the transporting device 3 and to the grinding machine 4 and is provided at its end nearer the latter with a reduced channel 9 in which the chips will be compressed to a plug that will meet a higher frictional resistance in the channel than the out-blasting force corresponding to the pressure in the boiler 2 and which will check escape of steam at said pressure. Both the inlet device 5 and the outlet device 8 are pro-

vided with stop means so as to prevent the steam from blasting if the supply of chips should cease.

When using the method and the apparatus according to the invention for the defibration of chips in the preparation of fibre boards the following advantages will be obtained:

1. A sufficient continuous heat treatment of the starting material before the defibration.

2. The brown colour tone of the board product can be predetermined by adjusting the thermostat valve on the boiler to a temperature suitable therefor.

3. A considerable saving of heat will be obtained, because very little steam and boiler liquor will accompany the chips heat treated; this state of affairs does not obtain with the known methods where temperatures above 100° C. are used. The consumption of steam by the present method is less than half of that by known methods.

4. Both the method and the apparatus involve a rational and economical solution of the problems in question, as the apparatus when the control means have been adjusted does not require any manual control and the heat consumption is very low.

5. A uniform and good quality can be obtained from the product prepared according to the invention, because the starting material will be homogenized during the heat treatment.

6. By adding suitable chemicals it is possible by the heat treatment in this apparatus to obtain a partial or complete digestion of certain components of the starting material, and the apparatus can consequently also be used for production of half or whole cellulose. Especially for the last-mentioned purpose several boilers with appendant transporting screws and outlet devices can be arranged in series each outlet device except the last being connected to the next boiler.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A method for the heat treatment of ligno-cellulosic material that is to be defibrated which comprises performing the heat treatment continuously at temperatures above 100° C. in a closed boiler into the upper end of which chips are fed by means of a higher pressure than that corresponding to the temperature in the boiler, subjecting the chips to a heat treatment in the boiler, transporting them from the bottom of the boiler by means of an elevating transporting

device the upper end of which is closely connected to an outlet device so constructed that it will check escape of steam by compressing the chips therein so as to form a plug which will result in a higher frictional resistance being set up in the outlet device than the out-blasting force corresponding to the pressure in the boiler and feeding the chips from the outlet device either into one or several additional similar boilers in series and eventually into a grinder or defibrator in which it is defibrated immediately at atmospheric pressure or directly from said outlet device to said grinder or defibrator.

2. An apparatus for the heat treatment of ligno-cellulosic material according to claim 1, comprising a boiler, or several boilers arranged in series, a grinder and a transporting device arranged between the, or the last boiler and the grinder, and between each boiler and the next when two or more boilers are arranged in series, said apparatus being characterized by an inlet device which is tightly connected to the upper end of the, or the

first, boiler and which is constructed so as to feed the chips into the boiler at a higher pressure than that corresponding to the temperature of the boiler and by constructing the transporting device so as to cause any boiler liquor accompanying the chips to flow back into the boiler, and by an outlet device which is tightly connected to the upper end of the transporting device and the next boiler of the grinder respectively and which is constructed so as to check escape of steam by compressing the chips therein to a plug.

3. A method of digesting and defibrating ligno-cellulosic material substantially as herein described.

4. An apparatus for digesting and defibrating ligno-cellulosic material substantially as herein described with reference to the accompanying drawings.

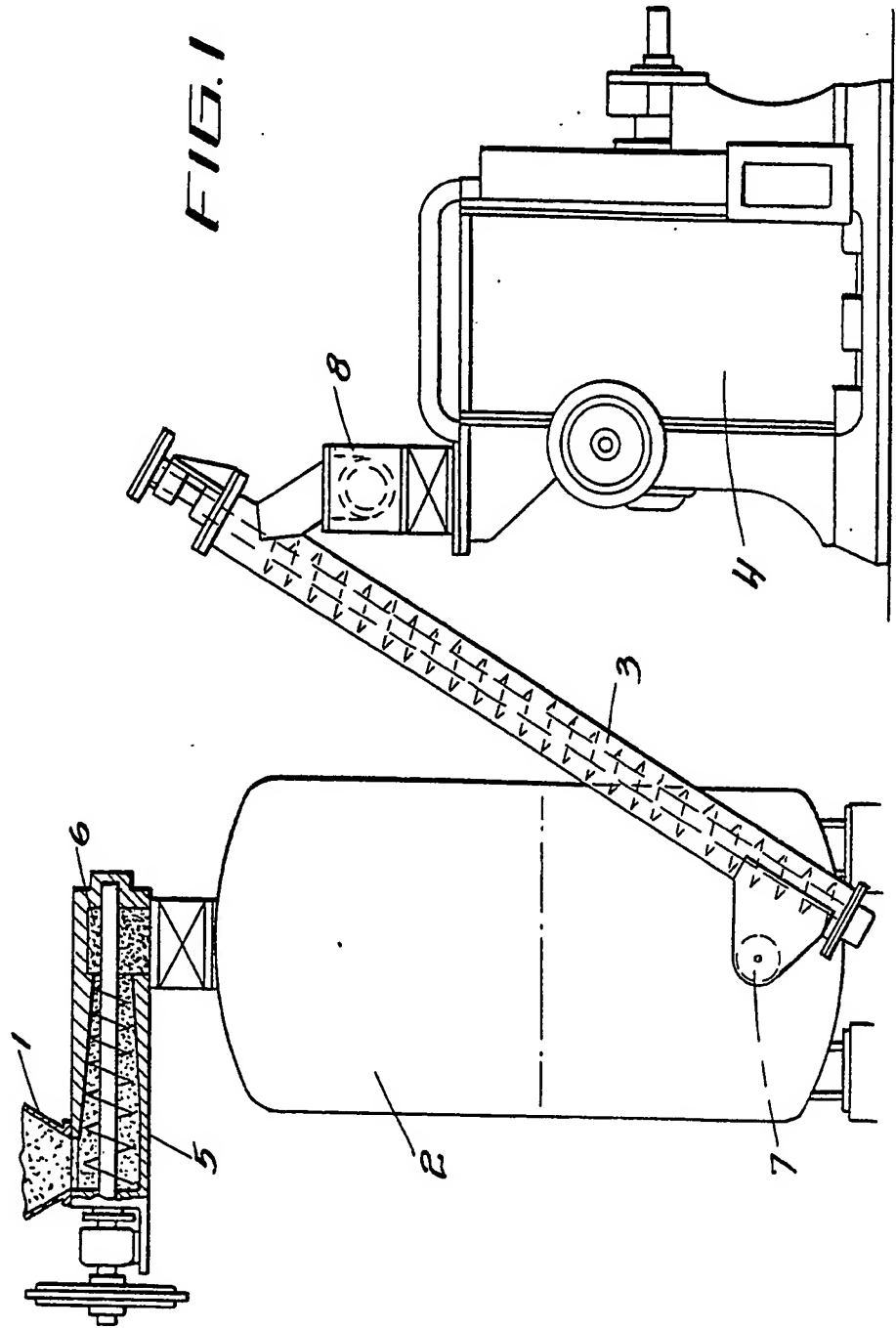
Dated this 19th day of October, 1948.

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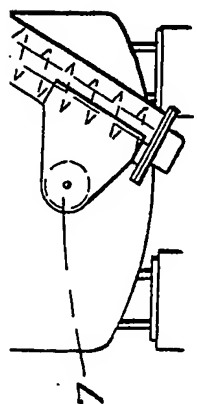
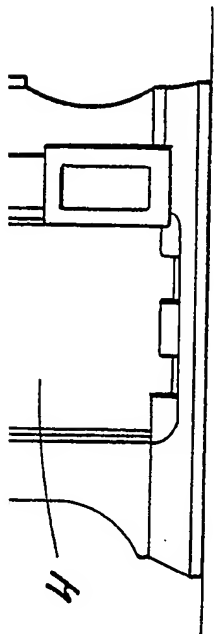
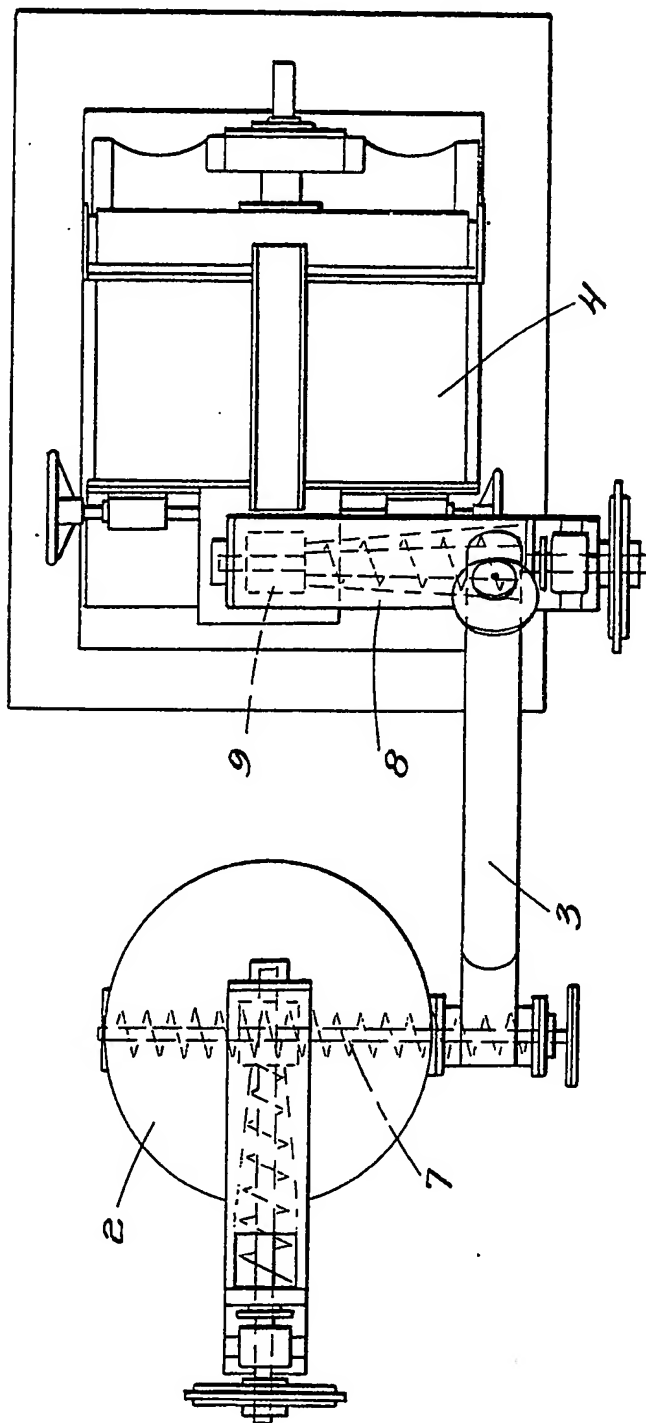


FIG. 2



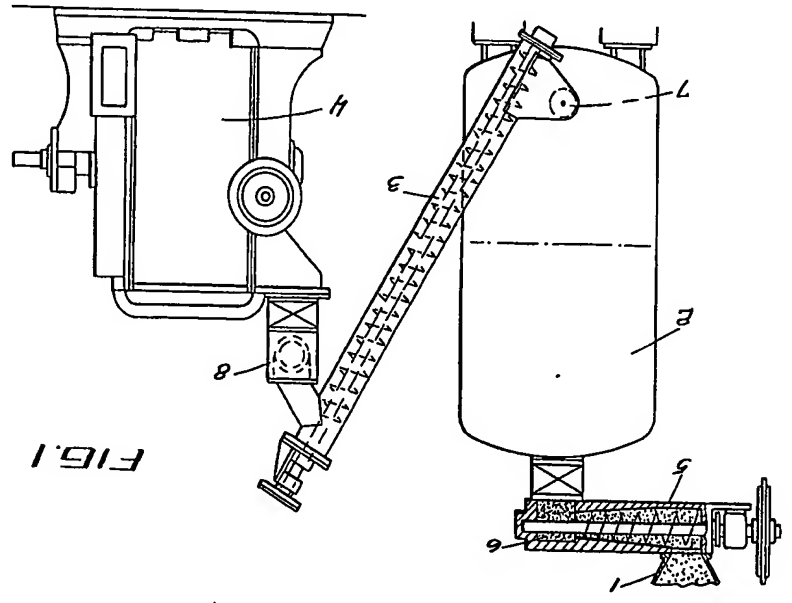


FIG. 1

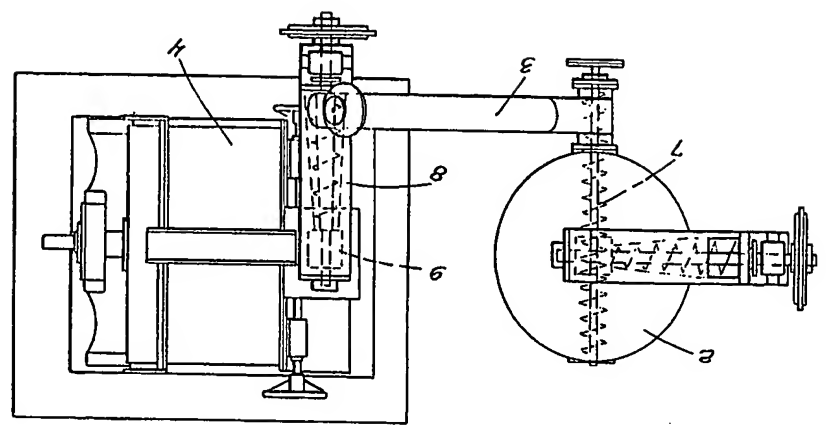


FIG. 2

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